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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,614	11/01/2001	Yuan-sheng Huang	67,200-565	8180

7590 10/17/2003

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT PAPER NUMBER

1763

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/004,614

Applicant(s)

HUANG ET AL.

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-19, drawn to an apparatus, classified in class 156, subclass 345.48.
- II. Claim 20, drawn to a process, classified in class 438, subclass 710+.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice another and materially different process such as plasma enhanced chemical deposition.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

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During a telephone conversation between examiner Binh Tran with attorney Randy Tung on 7/14/03 a provisional election was made with traverse to prosecute the invention of group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claim 20 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

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Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Drawings***

Figures 1a, 1b, 1c, 1d, and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1-line 2, and in claim 12-line 2, the limitation "a plasma chamber in which at least polymer is introduced" is not clear. The term "polymer" is not understood in the context of the previous phrase since a polymer is a product of a reaction between

certain gases and therefore it is not understood how is introduced into the chamber. Is applicant trying to claim the introduction of gases that produced polymer when they react with each other? Also, note that the claims further refer to the polymer subsequently in lines 6 and 8 of claim 1, and in line 6 of claim 12.

In claim 1-lines 5-6 and lines 7-8, the phrases "to hold a semiconductor wafer over the plasma chamber" and "positioning of the wafer over the chamber" respectively, are not clear since the term "over" means in or at a position above or higher than. Therefore, the claim seems to require that the semiconductor wafer be located outside the chamber in order to be "over the plasma chamber". Clarification is requested.

In claim 2-lines 2-3, the phrase "to hold the wafer over the plasma chamber" is not clear since the term "over" means in or at a position above or higher than. Therefore, the claim seems to require that the semiconductor wafer be located outside the chamber in order to be "over the plasma chamber". Clarification is requested.

In claim 3-lines 2-3 and in claim 13-lines 2-3, the phrase "a wafer chuck to move the wafer upside-down to over the plasma chamber" is not clear. It seems from the specification that the wafer chuck does not **moves** the wafer since it only **holds** the wafer upside-down in the plasma chamber. Also, the term "over" means in or at a position above or higher than. Therefore, the claim seems to require that the semiconductor wafer be located outside the chamber in order to be "over the plasma chamber". Clarification is requested.

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In claims 5, lines 3-4, the phrase "loading of the wafer from the wafer chuck" is not clear since it is not understood how the wafer is going to be loaded from the wafer chuck.

In claim 8-lines 2-3 and in claims 17, lines 2-3, the phrase "one or more induction coils coupled to an inductive supply" is not clear since it is not understood what applicant means by an "inductive" supply. For purpose of examination, the "inductive" supply has been interpreted as a power supply that couples power to the induction coils.

In claim 9-lines 2-3, the phrase "one or more electromagnetic coils coupled to an electromagnetic supply" is not clear since it is not understood what applicant means by an "electromagnetic" supply. For purpose of examination, the "electromagnetic" supply has been interpreted as a power supply that couples power to the electromagnetic coils.

In claim 11-lines 1-2 and in claim 19-lines 1-2, the phrase "a dielectric window below the chamber" is not clear since the term "below" means in or to a lower place. Therefore, the claim seems to require that the dielectric window be located outside the chamber in order to be "below the chamber". Clarification is requested.

### ***Claim Rejections - 35 USC § 102***

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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~~(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.~~  
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Claims 1-8, 11-17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishii et al., U.S. Patent 5,571,366.

Ishii et al. shows the invention as claimed including a semiconductor dry etching system comprising: a plasma chamber 2 in which reaction gases are introduced and reaction product particles formed fall down due to gravity (see col. 11, lines 37-39); an electrically biased mechanism (chuck 12') to hold a semiconductor wafer in the top of the chamber (upside-down), thereby preventing particles from falling onto the wafer (see fig. 12 and col. 11, lines 23-40). With respect to the introduction of a polymer into the chamber, limitation is directed to a method limitation instead of an apparatus limitation. The method limitations are viewed as intended uses which do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Ishii et al. is capable of introducing gases that will produce a polymer as a reaction product.

Additionally, with respect to claims 2-5, 7-8, 11, 13, 15-17 and 19, note that the apparatus of Ishii et al. further comprises: a) a vertically movable wafer lifter 76 to hold the wafer which comprises a tubular body having a substantially open-ended cap at a downward-facing end thereof against which the wafer is held, b) a bias supply 14 to the electrically biased mechanism, c) one or more coils coupled to a power supply, and d) a dielectric window as the lower wall of the chamber.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,571,366 in view of Uchida, U.S. Patent 5,804,027 or Ishii et al., U.S. Patent 5,795,429.

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Ishii et al. '366 is applied as above but does not expressly disclose that the one or more coils comprise one or more electromagnetic coils coupled to an electromagnetic supply. Uchida discloses an apparatus in which electromagnetic coils 6-8 connected to respective power sources are used to generate electromagnetic fields (see, for example, fig. 3). Similarly, Ishii et al. '429 discloses an apparatus in which

Art Unit: 1763

electromagnetic coil 106 is excited by power supply 107 to form an electromagnetic field (see, for example, fig. 22). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Ishii et al. '366 as to comprise one or more electromagnetic coils coupled to an electromagnetic supply since such structure is known and used in the art in order to generate electromagnetic fields.

Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,571,366 in view of the Admitted Prior Art (APA).

Ishii et al. is applied as above but does not expressly disclose that the apparatus further comprises one or more multi-pole magnets. The APA shows a semiconductor etching system, comprising: a plasma chamber 202 in which a polymer is introduced, excess polymer forming and subsequently peeling off the inner walls of the chamber and falls down due to gravity; and an electrically biased mechanism comprising a wafer chuck 218 to hold the semiconductor wafer and a bias supply 222 to electrically bias the wafer chuck; one or more coils 210 connected to RF power 214; one or more multi-pole magnets 204/206 to cooperating with the coil to assist inducement of the varying magnetic field within the chamber; and a dielectric window 208 (see fig. 2 and paragraphs 002-0010 of the instant application, especially paragraphs 009-0010).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Ishii et al. as to further comprise one

or more multi-pole magnets as taught by the APA in order to assist in the generation of the varying magnetic field within the chamber.

Claims 1-8 and 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Admitted Prior Art (APA) in view of Ishii et al., U.S. Patent 5,571,366.

The APA shows the invention substantially as claimed including a semiconductor etching system, comprising: a plasma chamber 202 in which a polymer is introduced, excess polymer forming and subsequently peeling off the inner walls of the chamber and falls down due to gravity; and an electrically biased mechanism comprising a wafer chuck 218 to hold the semiconductor wafer and a bias supply 222 to electrically bias the wafer chuck; one or more coils 210 connected to RF power 214; one or more multi-pole magnets 204/206; and a dielectric window 208 (see fig. 2 and paragraphs 002-0010 of the instant application, especially paragraphs 009-0010).

APA does not expressly disclose an electrically biased mechanism and wafer lifter that hold the wafer upside-down within the plasma chamber. Ishii et al. discloses a semiconductor dry etching system comprising: a plasma chamber 2 in which reaction gases are introduced and reaction product particles formed fall down due to gravity (see col. 11, lines 37-39); an electrically biased mechanism (chuck 12') to hold a semiconductor wafer in the top of the chamber (upside-down), thereby preventing particles from falling onto the wafer; and a vertically movable wafer lifter 76 to hold the wafer (see fig. 12 and col. 11, lines 23-40). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the

Art Unit: 1763

apparatus of the APA as to be arranged to be a face-down type apparatus comprising the electrically biased mechanism and wafer lifter that hold the wafer upside-down within the plasma chamber as taught by Ishii et al., because in such a way the wafer to be processed can be protected from being contaminated by particles and the like, therefore further improving the yield and the throughput.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Admitted Prior Art (APA) in view of Ishii et al., U.S. Patent 5,571,366, as applied to claims 1-8 and 10-19 above, and further in view of Uchida, U.S. Patent 5,804,027 or Ishii et al., U.S. Patent 5,795,429.


APA and Ishii et al. '366 are applied as above but do not expressly disclose that the one or more coils comprise one or more electromagnetic coils coupled to an electromagnetic supply. Uchida discloses an apparatus in which electromagnetic coils 6-8 connected to respective power sources are used to generate electromagnetic fields (see, for example, fig. 3). Similarly, Ishii et al. '429 discloses an apparatus in which electromagnetic coil 106 is excited by power supply 107 to form an electromagnetic field (see, for example, fig. 22). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of APA modified by Ishii et al. '366 as to comprise one or more electromagnetic coils coupled to an electromagnetic supply since such structure is known and used in the art in order to generate electromagnetic fields.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

September 25, 2003

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